NATIONAL WEATHER SERVICE WESTERN REGION SUPPLEMENT 20-2003
TO INSTRUCTION 10-513
DECEMBER 31, 2003

Operations and Services
Public Weather Services, NWSPD 10-5
WFO Winter Weather Products Specification, NWSI 10-513

WESTERN REGION WINTER WEATHER PRODUCTS

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SUMMARY OF REVISIONS: This supplement supersedes Western Region Supplement 1-2003 to Instruction 10-513, dated January 30, 2003. Minor wording changes made to sections 2 regarding winter storm outlooks, and in sections 2.2 and 4.2 for the addition of wind chill products to the WSW PIL.

Signed 12/12/03
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Director, Western Region

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1. Description. Hazardous winter weather is addressed by Western Region (WR) Weather Forecast Offices (WFOs) by issuing winter weather outlooks, watches, warnings, and advisories when conditions are expected to meet established criteria that pose a threat to people in the County Warning Area (CWA). Winter weather that does not meet hazardous criteria should be addressed in products such as the Short Term Forecast (AWIPS header NOW) or Special Weather Statement (AWIPS header SPS).

1.1 Forecaster Judgement. Written instructions cannot address every operational situation. All WFO personnel must exercise initiative and professional judgement to minimize risk to public safety and property in situations not explicitly covered by written instructions. Personnel must balance safety and needs of customers against frequency of warnings and possible constraint of travel and commerce. Protection of life and property shall take precedence in these decision making processes. As such criteria for winter storm warnings are considered guidance only, not strict thresholds. Forecasters may issued warnings based upon lower criteria if the event in question poses a significant threat to life due to timing or other circumstances. For example, an advisory would be appropriate for a minor snowfall event that takes place near rush hour, even if the amount may not meet strict criteria.

2. Products. Outlooks for potentially hazardous winter weather will be included in the daily Hazardous Weather Outlook (AWIPS header HWO). Outlooks can also be issued as separate Special Weather Statements (SPS) as stated in 10-515 section 3, but in order to keep duplication of effort to a minimum, separate outlooks are not mandatory in WR.

Watches, warnings, and advisories for winter weather hazards are issued under the category WSW, and are referenced in the appropriate section of the HWO. Each of these products use the modernized site ID for the appropriate WFO in the AWIPS header. See http://ww2.wrh.noaa.gov/public/WMOheaders/warningprods.htm for a full list of WMO and AWIPS Ids for WR winter weather products.

2.1 Product Types and appropriate lead times.

a. Outlooks. Outlooks are issued in the HWO for potential hazards which may develop in the Day 3-7 period of the forecast. An SPS (titled "Special Weather Statement" with a headline stating that it is a winter storm outlook) may be issued for events where extreme hazards are possible as discussed above. It is appropriate to include non-warning/advisory conditions in the HWO if those conditions could pose a significant threat to the public if they are not prepared.

b. Watches. Watches are issued when the risk of a hazardous weather event is significant in the 12 to 48 hour time frame, but occurrence, location, severity, and/or timing is uncertain. Watches may be issued beyond 48 hours for large synoptic scale storms, but care must be used so that we do not reduce the effectiveness of watches by issuing too many false alarms.

c. Warnings. Warnings are issued when an event meeting established criteria is occurring, imminent, or has a significant probability of occurrence within 36

hours. Warnings may be issued beyond 36 hours for large synoptic scale storms, but care must be used so that we do not reduce the effectiveness of warnings by issuing too many false alarms.

d. Advisories. Advisories are issued for certain events that have a significant probability of occurrence in the first 36 hours. These events are defined as non life-threatening by themselves, but they could become life-threatening if caution is not exercised.

2.2 Relationship to NPW. High wind watches/warnings and wind advisories will not be issued within WSWs. Issue all high wind watches/warnings/advisories as their own NPW product. Winter weather warnings/ advisories will not be combined with non-precipitation hazards in the NPW product at any time.

2.2.1 Combined wind and snow events. If strong winds will be in the same zones as winter precipitation that meets criteria, issue Blizzard/Winter Storm Warnings or Winter Weather Advisories rather than separate WSWs and NPWs.

2.3 Relationship to NOW. Both hazardous and non-hazardous winter weather may be addressed in the Short Term Forecast (NOW). When locally-established criteria for winter weather are met, NOWs should be issued to relay information for approximately the one to three hour time frame. When winter weather warnings or advisories are in effect, the appropriate headlines should be included in the NOW. NOWs should contain detailed information on timing and location (i.e., use "snow will end south of highway 224 by 7 pm" rather than "snow ending south this evening").

3. Criteria. Criteria for winter weather watches/warnings/advisories will consider climatology and customer needs, and reflect a balance between public safety and too many false alarms. Customers, emergency management officials, concerned federal, state and local government agencies, the media, Western Region Headquarters (MSD), and all other appropriate groups must be aware of WFO's criteria for winter weather watches, warnings, and advisories. Local customer and partner awareness will be maintained with regular outreach, and is especially important when criteria changes are being considered.

The State Liaison Office MIC (SLOMIC) will coordinate all criteria with MICs of WFOs within his/her state to ensure consistency for climatologically similar areas, keeping in mind those separated by state or county borders. To aid the coordination of warning and advisory criteria in adjacent CWAs, WFOs will post their winter weather watch/warning/advisory criteria in their SDM on the MSD intranet site http://sdm.wrh.noaa.gov.

3.1 Heavy Snow Warnings. Climatic and topographic variability across the west make it difficult to establish relevant heavy snow criteria with consistent snow amount-elevation relationships. Western Region includes mountain ranges such as the Rockies, the Sierra Nevada, and the Cascades which receive 500 or more inches of snow annually. In areas where snow is not common, such as in population centers at low elevations, public safety can be seriously impacted with even the slightest snow accumulation.

As a result, considerable flexibility is given to local WFOs to define heavy snow criteria within their County Warning Area (CWA). To avoid abrupt differences in heavy snow criteria between adjacent CWAs, MICs will coordinate their heavy snow criteria, and applicable elevation ranges, with the state liaison office (SLO) and neighboring WFOs. Some WFOs that have great differences in climate and topography across their areas may have many different heavy snow criteria throughout the CWA.

Taking into account the climatic and geographic variability described above, heavy snow criteria in Western Region will be defined as follows:

a. Where snow is considered common, heavy snow criteria of four inches or more in 12 hours or six inches or more in 24 hours will be used as the basic criteria.

b. Where greater snow accumulation is common (higher elevations or cold, wet climates) the MIC can establish higher thresholds to define heavy snow.

c. In areas where snow is rare and/or causes a significant impact to public safety, transportation, and commerce, the MIC can establish lower thresholds to define heavy snow.

3.1.1 Snow amount forecasts. The decision to issue a warning should be based, in addition to the mid point value method listed in 10-513 section 5.2.2.2, on the average amount of snow expected to affect the majority or most relevant portion of the forecast area. In zones where the population is well dispersed and winter weather will have a similar effect across the entire zone, generally the midpoint of the expected snowfall may be used to determine whether to issue a warning. In zones where the population is mostly confined to a small area within the zone, also consider the effect the snow will have on the population when making the warning decision. In mountains, use the snow amount that will most affect passes, roads and people, rather than that expected to fall at a remote point on a peak. Forecasters must balance public safety and the frequency of warnings/advisories in determining whether the threat requires heightened attention.

3.2 Advisories. MICs, in coordination with Emergency Management customers and adjacent WFOs, will determine and document local criteria governing the issuance of winter weather advisories. This can include the option NOT to issue certain types of advisories as deemed appropriate when considering climatology and other factors. WFOs will post their winter weather advisory criteria in their SDM on the MSD intranet site http://sdm.wrh.noaa.gov. See NWSI 10-513 section 6 for specific information on winter weather advisories.

3.3 Watches. Winter weather watch criteria are the same as warning criteria. However, when an advisory is issued following a watch, do not use the words “downgraded” to describe the advisory.

4. Product Format. WSWs are segmented products. Format details are well described in Instruction 10-513.

4.1 Overview. WSWs may include an optional overview section before the segments. The overview contains a general descriptive headline and synopsis of the event. It is placed before the segments, without UGC. Where prior state/local agreements require, they may be placed at the end of the WSW product.

4.2 Headlines. Each segment will contain a headline(s) for each watch/warning/advisory in effect for the applicable area. Headlines will include mention of WHAT type of event is being addressed, and WHERE and WHEN the event(s) is expected to occur or is occurring (e.g., "...WINTER STORM WARNING FOR NORTHERN UTAH TONIGHT..."). Each segment header will include a UGC and product issuance time.

For simplicity and consistency, WSW headlines for each segment should be limited to one of the following categories to the extent possible:

a. Winter Storm Watch/Warning
b. Heavy Snow Warning
c. Blizzard Watch/Warning
d. Snow/Blowing Snow/Freezing Rain Advisory
e. Winter Weather Advisory (for...)
f. Wind Chill Watch/Warning/Advisory

Other categories as listed in 10-513 Section 5.2.2.1 and 6.2.2.1 are allowed, but most are rare in WR. For advisories, WFOs should use advisory headlines that state the exact threat (e.g., "Snow Advisory, Blowing Snow Advisory, etc.). Where agreements are in effect with Emergency Management organizations, WFOs may instead use "Winter Weather Advisories", but should state the exact threat in the headline (i.e., use "Winter Weather Advisory for Freezing Rain", "Winter Weather Advisory for Snow and Blowing Snow" rather than just "Winter Weather Advisory").

4.3 Segment Content. Within each segment the free text description of the event will be concise and restricted to addressing the specifics of the weather that is expected. Where appropriate, include mention of specific highways or other geographic locations where the public would be especially vulnerable. A definition of watch/warning must be included as shown in 10-513 sections 4.3.4.2.b and 5.3.4.2.b if the event has not yet begun.

4.3.1 Call-to-Action Statements. Concise call-to-action statements should be included in each segment if the statements relay extremely urgent messages, such as potentially life-saving actions. Other less urgent call-to-action statements may be included in one of three ways: either separated from other content within a segment by using the **&&** separator; included as part of the overview; or grouped together after the $$ ending the final segment of the product. WFOs must remember that call-to-action statements not included in the segments will not be received by customers who program their systems to only receive their local segments.

5. Cancellations. When watch-warning-advisory products are canceled or allowed to expire, a WSW or NPW product will be issued to inform the public that the threat of significant weather has ended.

6. Verification. Verification statistics for winter storm events will be kept by each WFO. Verification should be performed in a timely manner during/after each warning/advisory event. Maintaining a good working relationship with state and local Departments of Transportation/ Highways, Law Enforcement Officials, and other groups will help WFOs gather snowfall data during and after events. WFOs are encouraged to contact these reliable sources during and shortly after events, in addition to receiving reports from trained spotters and dependable automated equipment. Subjective judgement, common sense, and honesty will be the guiding factors in determining both the occurrence of winter storm events and lead times. The final determination resides with the WFO MIC as to how a storm verified or whether an event occurred.

6.1 Quarterly Reports. Each office will prepare a quarterly report on winter storm warning (e.g., winter storms, heavy snow, blizzard) performance measure goals, warning accuracy (POD, FAR, CSI), and lead times. Other information must be reported on winter storm watches (see section 6.1.2). Each report should compare WFO statistics for the quarter with the national performance goals for that year, explain variances, and indicate actions being taken to address deficiencies. The quarterly periods are October- December, January-March, April-June, July-September. Quarterly reports from each office are due to WRH MSD by the fifth working day after the end of the quarter.

The following statistics are required quarterly for winter weather events:

a. Number of winter storm warnings issued: Consider blizzard warnings, heavy snow warnings, and all other hazardous winter precipitation events which are issued under the WSW category as being a "winter storm". Since warnings are issued by zones, a winter storm warning for ten zones will be considered as ten warnings. Each zone must be verified and tabulated separately. Verification for winter storm events will be determined using the **local criteria** for warnings, including snow amount and areal extent. (e.g., was the event over a large enough area that a warning should have been issued?). Use "seasonally adjusted criteria" (first winter storm of season may have a lower assigned criteria) as well as elevation criteria (e.g., 12 inches above 10,000 feet).

b. Number of winter storm warnings issued which verified: This will require that each warning be verified zone by zone, based on the prevailing snowfall amounts, not the extreme amounts. If surface observations are not available, then a best estimate should be made using radar, satellite, and/or extrapolation from nearby observations combined with the office's knowledge of local effects. If part of the zone verified and a portion did not, **judgement should be used as to whether enough of the area verified to result in a significant hazard to the public.**

c. Number of warnings issued which did not verify.

d. Number of winter storm events in which no warning was issued: Again, use local criteria and areal size of the event when determining if an event occurred for which a warning should have been issued.

e. Average event lead time: The lead time should be calculated as the time from warning issuance to the estimated time the warning criteria was met. This will require a judgement as to when an event began. Round to the nearest hour. The average lead time should be the arithmetic mean of all event lead times. Any event occurring without an issued warning is treated as a zero lead time event. Also, if a warning was issued within two hours after the event began and warning criteria met, use a lead time of zero (i.e., do not count negative lead times). Onset timing errors (warning was for tonight, but most of the snow fell the following day) will not be counted.

f. Number of warnings which verified and were preceded by a watch.

6.1.1 FAR, POD and CSI calculations. Each WFO should tabulate their individual year-to-date statistics for the period in question. To assist the effort, consider the following table:

OBSERVED \ FORECAST	Yes	No
Yes	a	b
No	c	d

Where:

Warnings issued: (a+c)
Correct warnings: (a)
Warnings which did not verify: (c)
Unwarned events: (b)

POD is defined as a /(a+b)
FAR is defined as c /(a+c)
CSI is defined as a /(a+b+c)

6.1.2 Watch information. Winter storm watches must also have some verification performed to make sure we are providing a valuable service to our customers. Not all watches must lead to warnings, and thus simple POD/FAR/CSI will not be tracked for watches. The following information will help measure the overall value of the watch program:

a. Number of watches issued. Same as 6.1.a except for watches.

b. Number of watches that lead to warnings. Same number as reported for 6.1.f.

c. Number of events not "watched". This number is calculated by determining the number of events that reached warning criteria, but were not preceded by a watch. Count all events that reached criteria, regardless of whether a warning was issued.

d. Lead time for watches. Calculate average watch lead time only for those watches that preceded events reaching warning criteria (regardless of whether a warning was issued). Using only those events, calculate the time from watch issuance until the time warning criteria was met. We will not be calculating any zero or negative lead time events for watches, only considering those that met warning criteria.

6.1.3 Report format. Each WFO must report the following information. The verification report should be combined with high wind warning verification as defined in the WR Supplement to Instruction 10-515. The information should be submitted to WR MSD on spreadsheet templates provided by MSD.

Station _____ Period _____

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# Warnings Issued  /a+c/ :                  Winter storm __ High wind __
# Correct Warnings  /a/  :                  Winter storm __ High wind __
# Warnings Incorrect/c/  :                  Winter storm __ High wind __
# Events not warned /b/  :                  Winter storm __ High wind __
# Warnings preceded by Watch:               Winter storm __ High wind __
Ave lead time for events (hrs):             Winter storm __ High wind __
Period POD   a /(a+b):                      Winter storm __ High wind __
Period FAR   c /(a+c) :                     Winter storm __ High wind __
Period CSI   a /(a+b+c):                    Winter storm __ High wind __
# Watches Issued /a+c/:                     Winter storm __ High wind __
# Watches that lead to warning:             Winter storm __ High wind __
# Warned events not "watched"/b/:           Winter storm __ High wind __
Ave lead-time for "watched" events (hrs):    Winter storm __ High wind __
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6.2 Annual reports. Each WFO must submit an annual report following the conclusion of each fiscal year. The report will follow the quarterly guidelines above and can contain corrections and additional information that was not known at the time of the quarterly report. It is due to WR MSD by the end of the third week in October. Submit the report using spreadsheets provided by WR MSD.

APPENDIX A

See also the examples contained in Appendix A of NWSI 10-513.

Example 1:

WWUS46 KMFR 111600
WSWMFR

URGENT - WINTER WEATHER MESSAGE
NATIONAL WEATHER SERVICE MEDFORD OR
900 AM PDT WED APR 11 2002

...SNOW AND FREEZING RAIN TODAY FOR SOUTH CENTRAL OREGON AND NORTHEAST CALIFORNIA...

...A LOW PRESSURE CENTER WILL DROP SOUTH ACROSS OREGON AND NORTHEAST CALIFORNIA DURING THE DAY TODAY. WIDESPREAD SNOW AND VALLEY FREEZING RAIN THIS MORNING WILL CHANGE TO SHOWERS IN THE AFTERNOON.

ORZ025-112200-
EASTERN DOUGLAS COUNTY FOOTHILLS-
INCLUDING STEAMBOAT...TOKETEE FALLS
900 AM PDT WED APR 11 2002

...SNOW ADVISORY FOR THE FOOTHILLS ABOVE 3000 FEET TODAY...SNOW SHOWERS WILL CONTINUE THIS MORNING AND TAPER OFF IN THE AFTERNOON. TOTAL SNOW ACCUMULATION WILL RANGE BETWEEN 3 AND 5 INCHES. EXPECT HAZARDOUS DRIVING CONDITIONS...ESPECIALLY OVER THE PASSES...THROUGH THIS AFTERNOON.

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ORZ026-112200-
JACKSON COUNTY-
RUCH-ROGUE RIVER-MEDFORD-ASHLAND-PROSPECT-BUTTE FALLS
900 AM PDT WED APR 11 2002

...WINTER WEATHER ADVISORY FOR FREEZING RAIN...SLEET...AND SNOW TODAY FOR THE ROGUE VALLEY...A SLIPPERY MIX OF FREEZING RAIN... SLEET...AND SNOW WILL CONTINUE THIS MORNING AND TAPER OFF IN THE AFTERNOON. FREEZING RAIN AND SLEET WILL BE MOST LIKELY ON THE ROGUE VALLEY FLOOR AROUND MEDFORD. WET SNOW WILL PERSIST ON THE HILLS ABOVE 2000 FEET. TOTAL SNOW ACCUMULATION WILL RANGE BETWEEN 3 AND 5 INCHES. DRIVING CONDITIONS WILL BE HAZARDOUS THROUGHOUT THE AREA TODAY.

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CAZ085-ORZ027-028-030-031-112200-
SOUTH CENTRAL OREGON CASCADES-SISKIYOU MOUNTAINS AND SOUTHERN OREGON CASCADES-NORTHEAST KLAMATH COUNTY AND WESTERN LAKE COUNTY-CENTRAL AND EASTERN LAKE COUNTY-MODOC COUNTY-INCLUDING CRESCENT LAKE...CRATER LAKE...UNION CREEK...HOWARD PRAIRIE...MT MCLAUGHLIN...GREEN SPRINGS...CHEMULT...GILCHRIST...BLY MTN... QUARTZ MTN...ADEL...TIONESTA...WILLOW RANCH
900 AM PDT WED APR 11 2002

...SNOW ADVISORY TODAY IN SOUTH CENTRAL OREGON AND NORTHEAST CALIFORNIA...SNOW SHOWERS WILL CONTINUE THIS MORNING ACROSS THE REGION AND TAPER OFF IN THE AFTERNOON. IN THE CASCADES STORM TOTALS WILL RANGE BETWEEN 5 AND 9 INCHES. LOCATIONS EAST OF THE CASCADE CREST WILL RECEIVE BETWEEN 3 AND 5 INCHES OF TOTAL SNOW ACCUMULATION ABOVE 4000 FEET.

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Example 2:

WWUS46 KOTX 120600
WSWOTX

URGENT - WINTER WEATHER MESSAGE
NATIONAL WEATHER SERVICE SPOKANE WA
1100 PM PDT WED APR 11 2001

WAZ031-120800-
NORTHEAST BLUE MOUNTAINS-
1100 PM PDT WED APR 11 2001

...HEAVY SNOW WARNING FOR THE BLUE MOUNTAINS HAS ENDED...

THE HEAVY SNOW THREAT HAS ENDED...AS SCATTERED SNOW SHOWERS CONTINUE TO DECREASE TONIGHT. REPORTS RECEIVED FROM THE AREA INDICATE THE STORM TOTAL ACCUMULATION WAS GENERALLY 8 TO 10 INCHES.

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